Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

A novel turbulent state of a dipolar exciton Bose-Einstein condensate[1] GERMAN V. KOLMAKOV, OLEG L. BERMAN, ROMAN YA. KEZERASHVILI, the New York City College of Technology, the City University of New York — We report the formation of a new state in a non-equilibrium Bose-Einstein condensate (BEC) of dipolar excitons: steady turbulence. Two different systems where the BEC is formed are considered: coupled semiconductor quantum wells and two-layer graphene separated by a semiconducting or dielectric barrier. The non-linear dynamics of the systems are studied by using the generalized Gross-Pitaevskii equation. It is demonstrated that in the BEC a steady turbulent state is formed at high enough pumping rates. This state is characterized by oscillations of the spatial distribution of the excitons and fast redistribution of the energy between the oscillatory modes. The dynamics of the system can be explained in terms of the propagation of the fluxes of two quantities – the energy and the number of particles. The analysis of these excitonic systems as well as the comparison with an atomic condensed state show that the formation of turbulence is a general effect in the BEC.

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Date submitted: 17 Nov 2012 Electronic form version 1.4